IN THE SPECIFICATION:

Please amend the specification as follows.

On page 1, replace paragraph [0001], which begins on line number 3, with the following new paragraph:

The present invention relates to conductive polymer composite structures in which conductive polymers are conductive ~~substrate~~ substrates are ~~composite~~ composites, ~~process~~ processes for producing the same, ~~process~~ processes for producing conductive polymers, bundles and stacked layers of conductive polymer composite structures.

On page 1, replace paragraph [0003], which begins on line number 19, with the following new paragraph:

As a process for producing conductive polymers, a process by electrochemical polymerization method is common. A common electrochemical polymerization method includes ~~by~~ adding monomer components such as pyrrole and the like in electrolytic solution, providing a working electrode and a counter electrode in this electrolyte, and applying a voltage between the electrodes, thereby forming conductive polymers as films on the working electrode (e.g. see pages 70 to 73, "Conductive polymers 8th edition by Naoya Ogata, published by Scientific K.K., February 10, 1990"). Conductive polymers obtained by electrochemical polymerization can be subject to displacement such as expansion-contraction or bending by applying a voltage to conductive polymers formed like films.

On page 2, replace paragraph [0004] , which begins on line number 1, with the following new paragraph:

When elements which include conductive polymers manufactured by electrochemical polymerization (hereinafter called conductive polymer elements) are used as actuators in a driving part for uses ~~of~~ related to large sized ~~equipments~~ equipment such as robot arms of industrial robots and the like, and artificial muscles such as artificial hands and the like, compared with elements for the uses ~~of~~ related to small sized actuators such as for micro machines and the like, it is necessary to make sizes of elements large enough to obtain a larger amount of expansion-contraction or larger electrochemical stress. Therefore, in order to enlarge sizes of conductive polymer elements, it is necessary that the conductive polymer films obtained by electrochemical polymerization are processed to be longer or thicker by piling up plural ~~of~~ films, or the like.

On page 2, replace paragraph [0006] , which begins on line number 25, with the following new paragraph.

However, in obtaining large electrochemical strain, there is a problem in that, regarding the conductive polymer elements with selected kinds of conductive polymers and dopants, for example, satisfactory potential cannot be applied at the upper portion of elements since the conductivity of conductive polymers obtained by electrochemical polymerization is generally around 10^2 S/cm even when electrodes are provided on the whole bottom surface in the case where the conductive polymer elements enlarged in the direction of the columnar body height are used, and in the dedoped state, since conductivity further lowers, satisfactory potential cannot be applied at the upper portion of the electrodes and when electrodes such as metal plates and the like are provided in the height direction, electrodes such as metal plates and the like inhibit the motion of conductive polymer elements, causing the

problem of difficulty for said conductive polymer elements to expand and contract.

On page 3, replace paragraph [0007], which begins on line number 9, with the following new paragraph:

In order to solve the above problem, as a means to obtain large electrochemical strain of conductive polymer elements, one idea of ~~pasting~~ applying highly conductive metal films on surfaces of conductive polymer elements may be considered. However, ~~since~~ conductive polymer elements provided with said metal films on surfaces inhibit deformation since highly conductive metal films have little deformation property, and these films cannot be applied to actuators which move in a linear manner by voltage application because displacement by electrochemical redox ~~becomes~~ results in bending but not expansion and ~~contract~~ contraction. In addition, when conductive polymer elements provided with said metal films are applied to actuators which ~~moves~~ move in a linear manner, a problem that metal films are separated from metal films due to repeated displacement and when metal films are firmly fixed to conductive polymer elements to conductive polymer elements with adhesives and the like, the problem that even bending motion is inhibited occurs. In addition, elements capable of uniformly applying electric charge over a whole element by connecting a lead to one point of a bottom surface of said elements are more advantageous since a composition of a element-driving device is not restricted.

On page 4, replace paragraph [0009] , which begins on line number 5, with the following new paragraph:

Further, since conductive polymers are liable to be cut during the operation process because mechanical strength of conductive polymers

themselves is not high, it is difficult to form desirable conductive polymer electrodes, that is, with an external diameter or width of less than 1 mm by processing such as cutting conductive polymer films obtained by electrochemical polymerization and the like in order to obtain small-sized conductive polymer elements represented by micro machines such as nano machines, catheters and the like. In addition, since conductive polymer elements are hard to be melted, production methods such as extrusion moldings, injection moldings and the like cannot be employed, the methods usually employed in producing thin lines such as wires or cylindrical resin mold products. For this reason, actuator elements which are driven to make expanding and contracting motion or to make bending motion by electrochemomechanical deformation of conductive polymers are not put into practical uses as small sized driving parts which include nano machines and micro machines. Therefore, in order to use such for small sized elements represented by nano machines and micro machines, it is also desirable to obtain actuator elements which are driven to make expanding and contracting motion or to make bending motion by electrochemomechanical deformation of conductive polymers as small sized elements with external diameter or width of less than 1 mm.

On page 4, replace paragraph [0010], which begins on line number 26, with the following new paragraph:

In addition, since it is desirable that large sized actuator elements can produce uniform electrochemical stress in each portion of said actuator elements, it is desirable to uniformize the amount of conductive polymers regarding each portion of actuator elements as a whole. Therefore, it is desirable to make further large actuator elements by using plural ~~of~~ actuator elements capable of being displaced for practical

use such as expansion and ~~contract~~ contraction or bending. It is necessary that each of ~~plural~~ a plurality of actuator elements which compose one large sized actuator is obtained but it is desirable that a number of them are produced efficiently and easily in a short time.

On page 5, replace paragraph [0011], which begins on line number 6, with the following new paragraph:

It is ~~the~~ an object of the present invention to provide elements capable of being displaced for practical use such as expansion and ~~contract~~ contraction or bending even when conductive polymer elements are used as large sized actuator elements.

On page 5, replace paragraph [0012], which begins on line number 12, with the following new paragraph:

The present invention relates to conductive polymer composite structures comprising conductive substrates and conductive polymers, wherein said conductive substrates have deformation property and conductivity of said conductive substrates is not less than 1.0×10^3 S/cm. By using said conductive polymer composites structures, deformation property is good even when the conductive polymer composite structures are used as larger sized actuator elements. Since said conductive polymer composite structures are provided with structures capable of applying potential to whole elements even when they are used as conductive polymer elements elongated in size in the length direction and in the height direction, satisfactory voltage can be applied for driving end portions when used as actuators.

On page 9, replace paragraph [0034], which begins on line number 20, with the following new paragraph:

Said conductive substrates may be included in such a way that satisfactory potential is applied over said whole conductive polymer composite structures, and as shown in Figs. 1 and 3, said conductive substrates may be arranged in the vicinity of a center of conductive polymer composite structures in the thickness direction or said conductive substrates may be arranged in the vicinity of surfaces of conductive polymer composite structures, however, it is preferable that said conductive substrates may be arranged in the vicinity of a center of conductive polymer composite structures in the thickness direction since satisfactory potential can be easily applied to the whole elements. In addition, it is preferable that said conductive substrates are included in substantially the whole said conductive polymer composite structures since satisfactory potential can be easily applied to the whole elements, and it is preferable that said conductive substrates have the same shapes as those of said conductive polymer composite structures since satisfactory potential can be easily applied to the whole elements.

On page 10, replace paragraph [0038], which begins on line number 21, with the following new paragraph:

Further, in conductive polymer composite structures of the present invention, groups of conductive polymer composite structures can be formed by forming bundles of a plural ~~of~~ conductive polymer composite structures which use coiled metal spring-type members as conductive substrates, further followed by bundling the conductive polymer composite structures. Fig. 5 is a drawing of cylindrical conductive polymer composite structures using coiled metal spring-type members as conductive substrates. Fig. 6 is a partial enlarged perspective view of one end regarding bundles (the first bundles of conductive polymer composite structures) of columnar conductive polymer composite

structures obtained by bundling cylindrical conductive polymer composite structures shown in Fig. 5. Fig. 7 is a partial enlarged perspective view of one end regarding groups of bundles (the second bundles of conductive polymer composite structures) of columnar conductive polymer composite structures obtained by bundling the first bundles of conductive polymer composite structures shown in Fig. 6. Fig. 8 is a partial enlarged perspective view of one end regarding bundles of groups (the third bundles of conductive polymer composite structures) of conductive polymer composite structures obtained by bundling the groups of cylindrical conductive polymer composite structures shown in Fig. 7.

On page 11, replace paragraph [0039], which begins on line number 5, with the following replacement paragraph:

In Fig. 5, conductive polymer composite structures 12 are tubular conductive polymer composite structures obtained by ~~jointing~~ joining metal wires 13 or 13' at both ends of coiled metal spring-type members in the length direction as a conductive substrate, connecting said metal wires 13 and 13' to a power supply and generating conductive polymers on a conductive substrate by a publicly known electrochemical polymerization method. In Fig. 5, although conductive polymer composite structures 12 are provided with metal wires on both ends, the metal wire may be provided on either end thereof.

On page 12, replace paragraph [0044], which begins on line number 29, with the following new paragraph:

Fig. 9 shows one embodiment of driving members 23 of actuators using said bundles of conductive polymer composite structures. Bundles 19 of four conductive polymer composite structures are fitted in pores

provided with fixing members 20 and 20' and are fixed by adhesives and the like. Metal wires provided in bundles of four conductive polymer composite structures form metal wire groups 21 in a bundle, and are connected to a power source interposing a lead. In catching portion 22 provided in fixing member 20', wires and the like can be positioned ~~in~~ such that operating objects ~~are~~ can be connected. Actuators can be formed by impregnating driving members 23 in electrolytic solution, and by coating solid electrolytes and driving members with resins and the like by placing solid electrolytes in a way to make them contact with bundles of conductive polymer composite structures.

On page 13, replace paragraph [0046], which begins on line number 9, with the following new paragraph:

In Fig. 9, four of said bundles are positioned in parallel. However, bundles used as driving members of actuators are not specifically limited in the numbers used, and depending on required electrochemical stress, not less than a 100-unit bundle, such as a 1000-united bundle, can even be used.

On page 13, replace paragraph [0047], which begins on line number 13, with the following new paragraph:

In order to achieve use for actuators which are used as large-sized driving devices, it is preferable to use not less than a 100-unit bundle for obtaining large electrochemical stress. Regarding alignment of said bundles, tubular, cylindrical and prismatic shapes may be formed, and for example, a tubular shape can be formed by arranging about 600-unit conductive polymer-metal wire composites. In addition, said fixing members can shown ~~effect~~ effects of bundling composites by fixing a

position of conductive polymer-metal wire composites and by fixing conductive polymer composite structures to said fixing members.

On page 13, replace paragraph [0049], which begins on line number 24, with the following new paragraph:

Conductive substrates included in conductive polymer composite structures of the present invention have a deformation property and a conductive ratio of said conductive substrates is not less than 1.0 X 10^3 S/cm. Since said conductive substrates have ~~its~~ a conductivity of not less than 1.0 X 10^3 S/cm, even when the size of conductive polymer composite structures which include said conductive substrates are made to be large, displacement for practical use, such as expansion and ~~contract~~ contraction, as actuators ~~becomes~~ become available.

On page 13, replace paragraph [0050], which begins on line number 32, with the following new paragraph:

Materials of said conductive substrates are not specifically limited as long as they show deformation property and have ~~its~~ a conductivity of not less than 1.0 X 10^3 S/cm. It is preferable that said materials are metals, metal plated polymer fibers, ~~and~~ or carbon materials from the view point of conductivity and mechanical strength. It is preferable that structures of said conductive substrates are structures that are capable of extending and contracting when conductive substrates have a conductive property with conductivity of not less than 1.0 X 10^3 S/cm by including non-deformation property materials such as metals and the like. Conductive substrates in which conductive substrates and conductive polymers are complexed, by having stretchable conductive substrates, displacement for practical use, such as expansion and ~~contract~~ contraction, as actuators ~~becomes~~ become available. In

addition, said conductive polymer composite structures can have improved mechanical strength since conductive substrates can function as core materials in said conductive polymer composite structures.

On page 14, replace paragraph [0051], which begins on line number 12, with the following new paragraph:

Said stretchable structures are not specifically limited as long as they are stretchable. Unlike plate structures or line segment structures, it is preferable that said stretchable structures have structures provided with structures having ~~space~~ spaces between members which compose conductive substrates such as coiled springs, plate springs, and meshes on a longitudinal section. As stretchable structures, spring-shaped members, meshed members, fiber structure sheets are ~~exemplified as exemplars~~ exemplary examples.

On page 14, replace paragraph [0053], which begins on line number 23, with the following new paragraph:

When said stretchable structures are meshed members, they are not specifically limited as long as they are stretchable and, for example, meshed members in which meshed space portions are polygons such as quadrangles, hexagons, octagons and the like can be used. Although said spaced portions are not specifically limited, when expansion and contraction is liable to occur in only one direction due to the shapes, such conductive polymer composite structures can be obtained that can control expansion and contraction in specific directions and when expansion and contraction is liable to occur in several directions, such as hexagons and the like due to the ~~shapes~~ shape, it is preferable to obtain such conductive polymer composite structures that can expand and contract in other directions such as right to left or up and down ~~and~~ or

the like.

On page 14, replace paragraph [0054], which begins on line number 35, with the following new paragraph:

Said meshed members may be ~~the~~ meshed members with a single layer provided with meshed spaced portions represented by metal meshes or they may be the meshed members in which plural ~~of~~ layers provided with meshed spaced portions are stacked. When said spaced portions are hexagons, said meshed members may be honeycomb structures in which spaces are formed in a honeycomb.

On page 15, replace paragraph [0055], which begins on line number 6, with the following new paragraph:

Further, as said stretchable structures, they may be stretchable fiber structure sheets. As said fiber structure sheets, they may be any one of knitted works, textiles, and non woven cloths and a deformation property can be shown depending on sheet structures, yarn characteristics, and yarn structures, however, plain stitches, circular rib stitches, and purl stitches with good deformation property or fiber structure sheets of knitted fabrics by weft knit composed of combinations thereof are preferable since a deformation property can easily be obtained.

On page 16, replace paragraph [0061], which begins on line number 18, with the following new paragraph:

The present invention relates to layered structures which include conductive polymer-containing layers and solid electrolyte layers, in which said conductive polymer-containing layers are provided with conductive polymer composite structures which include conductive

substrates and conductive polymers, in which said conductive substrates have deformation property and in which conductivity of said conductive substrates is not less than 1.0 X 10^3 S/cm. Since said stacked layers include said conductive polymer-containing layers and said solid electrolyte layers, electrolytes in said solid electrolytes are provided in said conductive polymer-containing layers and even when not in liquid electrolytic solution, displacement such as expansion and ~~contract~~ contraction or bending as actuators can be made.

On page 16, replace paragraph [0062], which begins on line number 29, with the following new paragraph:

Although it is preferable that said conductive polymer-containing layers in said electrolytes and said solid electrolyte layers directly contact ~~with~~ each other, other layers can be interposed therebetween as long as electrolytes in said solid electrolytes can be made to move to said conductive polymers. For example, in tubular conductive polymer composite structures in Fig. 1, said cylindrical stacked layers may be formed by filling solid electrolytes in ~~a~~ communicated space portions. In addition, by winding the conductive polymer composite structures in Fig. 3 around the outer surfaces of cylindrical solid electrolytes, cylindrical stacked layers may be formed.

On page 17, replace paragraph [0064], which begins on line number 6, with the following new paragraph:

The present invention relates to a process for producing conductive polymers by electrochemical polymerization using conductive substrates as working electrodes in which said conductive substrates have deformation property and the conductivity of said conductive substrates is not less than 1.0 X 10^3 S/cm. By using a process for producing

conductive polymers of the present invention, conductive polymers are polymerized electrochemically and conductive polymer composite structures can easily be obtained that are provided with structures in which conductive substrates and conductive polymers are complexed.

On page 17, replace paragraph [0067], which begins on line number 22, will the following new paragraph:

In ~~the~~ a process for producing conductive polymers of the present invention, when coiled spring-shaped members made of metals are used as working electrodes at the time of electrochemical polymerization, a cylindrical conductive polymer composite structures can be obtained as shown in Fig. 1. In electrochemical polymerization, by applying a voltage to coiled spring-shaped members made of metals which are working electrodes, conductive polymers are polymerized on a wire surface and conductive polymers grow from surfaces of working electrodes. By this growth, as shown in Fig. 2, spaces between wire materials which make up coiled spring members made of metals are filled in and cylindrical conductive polymer composite structures shown in Fig. 1 can be obtained.

On page 18, replace paragraph [0069], which begins on line number 8, with the following new paragraph:

In the process for producing conductive polymers of the present invention, the sizes of conductive substrates used as working electrodes are not specifically limited and large sized conductive substrates may be used, such as metal meshes with not less than 50 mm X 50 mm and coiled spring-shaped members made of metals whose outer diameters are not less than 3 mm, or small sized conductive substrates may also be

used, such as coiled spring-shaped members made of metals and the like whose diameter is several dozen μ m.

On page 19, replace paragraph [0073], which begins on line number 8, with the following new paragraph:

As methods of electrochemical polymerization used in the process of producing conductive polymers, it is possible to use publicly known methods of electrochemical polymerization as electrochemical polymerization of monomers of conductive polymers. Therefore, publicly known electrolytic solution and monomers of conductive polymers can be used and any one of constant potential methods, constant current methods, and potential sweep methods can be used -- for example, said electrochemical polymerization is preferably conducted under the condition where the current density is 0.01 to 20 mA/cm^2 and the reaction temperature is – 70 to 80°C, preferably current density of 0.1 to 2 mA/cm^2 and a reaction temperature of – 40 to 40°C, and more preferably, reaction temperature of – 20 to 30°C.

On page 19, replace paragraph [0074], which begins on line number 19, with the following new paragraph:

In the process for producing conductive polymers of the present invention, although publicly known solvent can be used as electrolytic solution for electrochemical polymerization, electrolytic solution which includes organic compounds as solvents can be used. It is preferable that said organic compounds include (1) chemical bonding selected from at least one ~~from~~ of the groups of chemical bond made up of ether bond, ester bond, carbon-halogen and carbonate bond and/or (2) functional groups selected at least one from the groups of functional groups made up of hydroxyl groups, nitro groups, sulfone groups, and nitryl groups in

molecules.

On page 19, replace paragraph [0075], which begins on line number 28, with the following new paragraph:

In addition, publicly known dopant may be included in said electrolytic solution and in order to obtain larger deformation ratio per redox cycle, it is preferable to include trifluoromethanesulfonate ion and/or anions including plural of fluorine atoms bonding to a central atom. Further, in order to make a deformation ratio per redox cycle of obtained conductive polymers not less than 16%, as anions in said electrolytic solution, it is preferable to use perfluoroalkylsulfonylimide ion represented by chemical formula (1) below instead of using trifluoromethanesulfonate ion and/or anions including plural of fluorine atoms bonding to a central atom.

$(C_nF_{(2n+1)}SO_2)(C_mF_{(2m+1)}SO_2)N^-$ (1)

On page 20, replace paragraph [0077], which begins on line number 4, with the following new paragraph:

In ~~the~~ a process for producing conductive polymers of the present invention, monomers of conductive polymers included in electrolytic solution for electrochemical polymerization are not specifically limited as long as they are compounds which become polymers by oxidation by electrochemical polymerization and show conductivity, and examples include five-membered heterocyclic compounds such as pyrrole, thiophene, isothianaphthene and the like and derivatives of alkyl groups, oxyalkyl groups thereof arid the like. Among them, hetero five-membered ring compounds such as pyrrole, thiophene and the like or derivatives thereof are preferable and particularly, conductive polymers including pyrrole and/or pyrrole derivatives are preferable for easy production

process and stability as conductive polymers. In addition, the above monomers can be used together in combinations of two or more of them.

On page 21, replace paragraph [0080], which begins on line number 5, with the following new paragraph:

Ni plates ~~with~~ which are longer sideways are used as a terminal portion of working electrodes 25. In the process for producing conductive polymer composite structures of the present invention, shapes of a terminal portion of working electrodes are not specifically limited and they may be cylindrical, meshed, and the like. In addition, materials of said terminal portion of working electrodes are not specifically limited as long as they show conductivity and as long as said working electrodes can be set and conductive materials such as metals and non-metals can be used.

On page 21, replace paragraph [0081], which begins on line number 13, with the following new paragraph:

In Fig. 10, ten working electrodes are attached to a terminal portion of working electrodes and a working electrode 4 is bundled to form one by twisting four coiled conductive substrates, and plural of working electrodes 27 are positioned in a terminal portion of working electrodes 25, thereby forming a group of working electrodes. When many of said conductive substrates are bundled to form a bundle, electrochemical polymerization may be conducted with one working electrode and compared with when each of many conductive substrates are subject to electrochemical polymerization separately followed by bundling with one electrochemical polymerization process, time can greatly be reduced. In addition, when large-sized actuator elements are to be obtained using conductive polymer composite structures, it is

preferable that many of working electrodes are attached to a terminal portion of working electrodes using plural ~~of~~ composites with many coiled conductive substrates bundled for effective process with less time.

On page 21, replace paragraph [0082], which begins on line number 27, with the following new paragraph:

It is preferable that said conductive substrates show conductivity of not less than 1.0 X 10^3 S/cm, and they may be formed by conductive materials such as conductive metals, carbon and the like and the surface of them may be coated with conductive materials such as conductive metals, carbon and the like by plating and the like. With the conductivity of not less than 1.0 X 10^3 S/cm as said conductive substrates, even when conductive polymer composite structures with enlarged size in the length direction or height direction are used, sufficient potential for displacement such as expansion and ~~contract~~ contraction can be applied to the whole element. As conductive substrates which include conductive metals, metal such as Ag, Ni, Ti, Au, Pt, Ta, W, and the like or alloys thereof, and other alloys such as SUS and the like can be used. In particular, it is preferable that said conductive substrates are W alloys and Ni alloys in order to obtain conductive polymers which operate stably in operational electrolytic solution.

On page 22, replace paragraph [0083], which begins on line number 6, with the following new paragraph:

In the process for producing conductive polymer composite structures of the present invention, said working electrodes may be a one coiled conductive substrate with each working electrode or may be bundles in which coiled conductive substrates are bundled. When coiled

conductive substrates that are used as said working electrodes are long, resistance becomes large since metal wires are narrow and long due to coiled conductive substrates which are working electrodes, and as the conductive substrates get longer, transmission of potential gets worse and the formation of conductive polymers on conductive substrates becomes difficult. In such cases, by making said working electrodes bundles in which coiled conductive substrates are bundled, at the time of electrochemical polymerization, stable potential can be provided to the whole conductive substrates and the efficiency of electrochemical polymerization improves and the time for producing process can be shortened. In addition, since conductive polymer composite structures obtained by electrochemical polymerization using said bundles are in the state where ~~plural~~ a plurality of conductive substrates are complexed with conductive polymers in which plural ~~of~~ conductive substrates are bundled together, compared with the process for obtaining conductive polymer composite structures by complexing each of the coiled conductive substrates separately, the space of an electrolyte bath can be saved and the same effect can be obtained when many conductive substrates are complexed at once.

On page 23, replace paragraph [0085], which begins on line number 3, with the following new paragraph:

Although said bundles are not specifically limited, it is preferable that said bundles are bundles composed of four to one hundred coiled conductive substrates for good workability and efficiency of electrochemical polymerization and that such bundles do not inhibit deformation property of conductive polymer composite structures.

On page 23, replace paragraph [0087], which begins on line number 13, with the following new paragraph:

In Fig. 10, in working electrode 27, connection wire 28 is connected to working electrode terminal portion 25 at working electrode connection portion 26 by soldering in which connection wire 28 is connected to the upper part of working electrode 27 when the lengthwise direction for said electrode 27 is arranged in the vertical direction. In ~~the~~ a process for producing conductive polymer composite structures of the present invention, methods of fixing said connection portion of a working electrode are not specifically limited as long as electric conductivity is available by said methods and such methods may be selected from soldering, conductive adhesion, spot welding, clip-on, or screw fastening in which connection wires are fixed by screw heads. For information, said connection wires need not be requisite ones and said working electrodes may be directly connected to a terminal portion of working electrodes and it is preferable that the electrode holders of the present invention are provided with conductive connection wires made of metals in order to facilitate the operation of attaching working electrodes to a terminal portion of working electrodes.

On page 23, replace paragraph [0088], which begins on line number 29, with the following new paragraph:

In Fig. 10, electrode holders 24 are provided with plate-like electrode fixing portions 29a, 29b, 29c, and 29d whose thickness is substantially the same and said electrode fixing portions form frame-like shapes. On back surfaces of electrode fixing portions 29a, 29b, 29c, and 29d combined in frame-like shapes, counter electrodes 30 with substantially the same size with frame-shaped outer size formed by said electrode fixing portions are fixed. Since working electrode terminal

portions 25 are provided on a face of the electrode fixing portion 29a and the counter electrodes are fixed on the back surfaces of electrode fixing portions, the spaces between counter electrodes in each working electrode become substantially the game and the amount of conductive polymer included in each of the obtained conductive polymer composite structures can easily be made substantially constant.

On page 24, replace paragraph [0089], which begins on line number 10, with the following new paragraph:

Although the spaces between counter electrodes in each working electrode are not specifically limited as long as conductive polymer can be formed on working electrodes by electrochemical polymerization, the spaces are preferably 1 to 50 mm. When the space between a working electrode and a counter electrode is less than 1 mm, a short circuit is liable to occur by the contact of working electrodes and electrodes, and on the other hand, when the space between a working electrode and a counter electrode is larger than 50 mm, a voltage becomes too much with constant current methods causing electrolytes to deteriorate, causing performance of generated conductive polymers to lower, and with constant potential methods, electrolytic current becomes extremely small and it takes time to form desired ~~amount~~ amounts of conductive polymers in on working electrodes. Further, in the process for producing conductive polymer composite structures of the present invention, counter electrodes need not always be fixed to holders of working electrodes. Holders of working electrodes may be fixed in the specified position of an electrolytic bath so that the spaces between counter electrodes in each working electrode with said counter electrodes fixed to an electrolytic bath.

On page 24, replace paragraph [0090], which begins on line number 17, with the following new paragraph:

In Fig. 10, electrode holders are provided with four electrode fixing portions, however, they are not always plural and any ~~shapes~~ shape such as all-in one frame shapes may be used so long as they do not block off between counter electrodes and working electrodes. For example, electrode fixing portions having small areas can be obtained and therefore, resource saving is available by providing working electrode terminal portions on plate-shaped electrode fixing portions with long side ways configurations and by fixing them on a specific position of the upper part of an electrolyte bath so that the working electrodes connected to working electrode terminal portions hang vertically downward when counter electrodes are fixed to an electrolytic bath. Further, it is preferable that said electrode fixing portions are formed by insulating materials in order to avoid direct conductivity of counter electrodes and working electrodes and although they may be plastics, ceramics, glasses, and insulating coating metals and the like, polypropylene, PTFE, polyethylene, and glass are more preferably used as easy formation and for good resistance to solvents. In addition, when 6 said electrode fixing portions do not have an insulating property, by sandwiching an insulating sheet between working electrode terminal portions and electrode fixing portions or between electrode fixing portions and counter electrodes, direct conductivity of counter electrodes and working electrodes can be avoided.

On page 25, replace paragraph [0091], which begins on line number 10, with the following new paragraph:

In the process for producing conductive polymer composite structures of the present invention, the shapes of counter electrodes are

not specifically limited as long as the conductivity is available between the counter electrodes and the working electrodes and shapes may be plate-shaped, meshed, coiled, bar-shaped, cylindrical, and the like. In addition, said counter electrodes are not specifically limited as long as they have conductive property and metals such as Ni, Au, Pt, and the like or carbon may be included.

On page 25, replace paragraph [0092], which begins on line number 16, with the following new paragraph:

Fig. 11 shows the state in which a lead for turning on electricity on electrode holders between counter electrodes and working electrodes in the process for producing conductive polymer composite structures of the present invention. Three leads 31 are connected to working electrode terminal portion 25 provided in electrode holders 24 and interposing lead 31', ~~they~~ which are connected to power supply 32. Further, leads 10 are also connected to counter electrode 7 and they are also connected to power supply 9. Suspended, electrode holders 24 are impregnated in an electrolytic bath 34 provided with electrolytic solution 35 and electrochemical polymerization is conducted with potential applied by power supply 32. For information, methods for retaining the state of impregnating electrode holders 24 in an electrolytic bath 34 are not specifically limited, and other than methods of suspending electrode holders, ~~methods include~~ including inserting electrode holders in an electrolyte bath providing slots, leaving electrode holders in a form of self-standing state such as containing them in a box in an electrolyte bath and the like, and various other methods can be used which will fit the shapes and sizes of an electrolyte bath. Further, when electrode holders are immersed in an electrolyte bath, it is preferable that whole said electrode holders are immersed in an electrolytic solution except

working electrode terminal portions so that conductive polymers are not generated on working electrode terminal portions.

On page 26, replace paragraph [0094], which begins on line number 11, with the following new paragraph:

It is preferable that leads which are connected to said working electrode terminal portions are connected to working electrode terminal portions in required numbers ~~so~~ <u>such</u> that stable potential could be provided to the whole working electrode terminal portions depending on <u>the</u> materials of working electrode terminal portions. In ~~the~~ <u>a</u> process for producing conductive polymer composite structures of the present invention, conductive polymers are generated on plural ~~of~~ working electrodes provided in electrode holders by conducting electrochemical polymerization comprising the steps of impregnating electrode holders in an electrolytic solution, followed by turning on electricity interposing electrolyte between <u>the</u> counter electrodes and <u>the</u> working electrodes.

On page 26, replace paragraph [0097], which begins on line number 35, with the following new paragraph:

Trifluoromethanesulfonate ion included in electrolytic solution for expanding and contracting said conductive polymer composite structures as operational electrolytic solution is a compound represented by the chemical formula of $CF_3SO_3^-$. Further, anions which include plural ~~of~~ fluorine atoms which bond to <u>a</u> central atom ~~is the ion~~ <u>are ions</u> having structures in which plural ~~of~~ fluorine atoms bond to <u>a</u> central atom such as boron, phosphorus, antimony, arsenic, and the like. In addition, sulfonate with a carbon number of not greater than 3 are not specifically limited as long as they are salts of sulfonic acid with a carbon number of not greater than 3 and for example, sodium methanesulfonate and

sodium ethanesulfonate can be used. Said electrolytic solution may be aqueous solution which includes sodium chloride as supporting electrolytes. By mainly including sodium chloride which is an electrolyte contained in organism, in said electrolytic solution, motion is available in which compatibility between body fluid in organism and said electrolytic solution can easily be made. In addition, regarding, method of electrochemomechanical deformation, electrolytic solution which operates conductive polymers may include

$$(C_nF_{(2n+1)}SO_2)(C_mF_{(2m+1)}SO_2)\ N^-$$

On page 27, replace paragraph [0099], which begins on line number 20, with the following new paragraph:

It is preferable that the conductive polymer composite structures which include conductive polymers obtained by the process for producing conductive polymers by using electrochemical polymerization, wherein said electrochemical polymerization method uses electrolytic solution which includes perfluoroalkylsulfonylimide ion represented by a chemical formula of

$$(C_nF_{(2n+1)}SO_2)(C_mF_{(2m+1)}SO_2)\ N^-$$

On page 28, replace paragraph [0105], which begins on line number 30, with the following new paragraph:

In other words, said actuator elements can preferably be used as driving parts which generate rectilinear driving force, as driving parts which generate driving ~~force~~ forces for moving on track shaped rails composed of circular arc portions, or as pressing parts moving in a rectilinear manner or in a curved manner in OA apparatuses, antennae, seating devices such as beds or chairs and the like, medical apparatuses, engines, optical equipments, fixtures, side trimmers, vehicles, elevating

machines, food processing devices, cleaning devices, measuring instruments, testing devices, controlling devices, machine tools, process machinery, electronics devices, electronic microscopes, electric razors, electric tooth brushes, manipulators, masts, play game devices, amusement devices, simulation devices for automobiles, holding devices for vehicle occupants, and expanding devices for accessories in aircraft. Said actuators can be used as driving parts which generate rectilinear driving force, as driving parts which generate driving ~~force~~ forces for moving on track shaped rails composed of circular arc portions, or as pressing parts moving in a rectilinear manner in, for example, valves, brakes, and lock devices used as machinery as a whole including the above mentioned instruments such as OA apparatus, measuring instruments, and the like. Further, other than said devices, instruments, and machines, in mechanical components as a whole, said actuators can preferably be used as driving parts of positioning devices, driving parts of posture control devices, driving parts of elevating devices, driving parts of carriers, driving parts of moving devices, driving parts of regulating devices for the content amount, directions, or the like, driving parts of adjusting devices of axes and the like, driving parts of guiding devices, and as pressing parts of pressing devices. In addition, said actuators, as driving parts in joint devices, can preferably be used as driving parts which impart revolving movement to joint portions or joints where direct driving is applicable such as joint intermediate members and the like. Said actuator elements of the present invention can preferably be used as driving parts of changeover devices for wires and the like, driving parts of reversing gears for products and the like, driving parts of winding devices for wires and the like, driving parts of traction apparatuses, and driving parts of swing devices in horizontal directions

such as oscillation and the like.

On page 30, replace paragraph [0107], which begins on line number 1, with the following new paragraph:

Said actuator elements of the present invention can preferably be used, for example, as driving parts of a drive mechanism relocating measuring portions or feeding portions making high frequency power feeding portion such as antennae shared between the frequencies for radio astronomy move to second focul point, and driving parts for lifting ~~mechanism~~ mechanisms in masts used for example for vehicle-loaded pneumatic operating stretchable masts (telescoping masts) and the like or antennae.

On page 30, replace paragraph [0111], which begins on line number 34, with the following new paragraph:

Said actuator elements of the present invention can preferably be used as, for example, driving parts of calibration devices of imaging devices with compensation function for blurring of images due to hand movement, driving parts of lens driving mechanism of lens for home video camera, and the like, driving parts of driving mechanism of mobile lenses of optical devices such as still cameras, video cameras, and the like, driving parts of automatic focus parts of cameras, driving parts of lens-barrel used as image-taking devices of cameras, video cameras, and the like, driving parts of automatic guiders which take in the light of optical telescopes, driving parts of lens driving mechanism or lens-barrel of optical devices having two optical systems such as stereoscopic cameras, binoculars, and the like, driving parts or pressing parts providing compressing force to fibers of wavelength conversion of fiber-type wavelength tunable filters used as optical communication, optical

information processing and for optical measuring and the like, driving parts of optical as alignment devices, and driving parts of shutter ~~mechanism~~ mechanisms of cameras.